

Claims

1. Device for conducting measurements on biological components, especially on live cells, with at least one field effect transistor (1) that has on a substrate a source, a drain, and a channel area (4) connecting said source and drain, on which a gate electrode (8) that is insulated from the channel area (4) by a thin insulation layer (6) is arranged, **characterized in that** the gate electrode (8) has at least two electrode regions (10) arranged laterally next to each other, which are separated from each other perpendicular to the direction in which the channel area (4) connects the source electrode (3a) to the drain (3b) and are electrically insulated from each other.
2. Device as defined in claim 1, characterized in that at least three, principally at least five, and preferably at least seven of the electrode regions are arranged in a row next to each other.
3. Device as defined in claim 1 or 2, characterized in that the edges of the drain (3a) and the source (3b) bordering the channel area (4) run approximately parallel to each other, and in that facing electrode edges of neighboring electrode regions (10) each run at approximately right angles to the edges of the drain (3a) and/or the source (3b) bordering the channel area (4).
4. Device as defined in one of claims 1 to 3, characterized in that an electrical insulation layer (12a, 12b) is arranged on the drain (3a) and the source (3b), respectively, which is preferably an oxide layer whose thickness is thicker by a factor of at least 10, if applicable 30, and preferably 50 than the insulation layer (6), and that the electrode region (10) and, if applicable, the insulation layer (6) each border laterally directly on the edge of the insulation layer (12a, 12b) facing the channel area (4).
5. Device as defined in one of claims 1 to 4, characterized in that the area that is covered by the individual electrode regions (10) at the channel area (4) respectively, is smaller or equal to the area that covers a focal contact of a biological cell (14) that can be immobilized on the gate electrode, and is preferably between 0.5 and 5 μm^2 .
6. Device as defined in one of claims 1 to 5, characterized in that the insulation layer (6) is designed as a silicon-oxide layer, in particular as a silicon-dioxide layer, and the gate electrode (8) as a precious metal layer, in particular as a palladium layer, that between the insulation layer (6) and the gate electrode (8) a poly-silicon layer (8) is arranged, which is

interrupted in the spaces between the neighboring electrode regions (10), and that there is a precious metal silicide layer between the poly-silicon layer (8) and the precious metal layer, which connects the two.

7. Device as defined in one of claims 1 to 6, characterized in that the gate electrode borders directly onto a measurement chamber or a trough for the reception of the biological component(s) and, if necessary, a nutrient solution containing said biological component(s).

8. Device as defined in one of claim 1 to 7, characterized in that the individual electrode regions (10) are each connected by a circuit path with an electrical contact element, which - for contact with the biological component - is arranged in a biological component contact area separate from the gate electrode (8).

9. Device as defined in one of claims 1 to 8, characterized in that it has several field effect transistors (1), and that these field effect transistors (1) are preferably arranged in a matrix-form on a common semiconductor substrate.

10. Device as defined in one of claims 1 to 9, characterized in that at least one electrode region (10) gate electrode (8) and/or one existing and neighboring stimulating electrode in addition to the electrode regions is connected to electric stimulation equipment for the biological component.

11. Use of a device as defined in one of claims 1 to 10 designed to measure a signal on a biological cell extracellularly, especially a change in cell potential.